# MICHIGAN BUILDING RESILIENCE AGAINST CLIMATE HEALTH EFFECTS:

**COLLABORATION OF THE** 

GREAT LAKES SCIENCES + ASSESSMENT CENTER (GLISA) & MICHIGAN CLIMATE & HEALTH PROGRAM (MICHAP)

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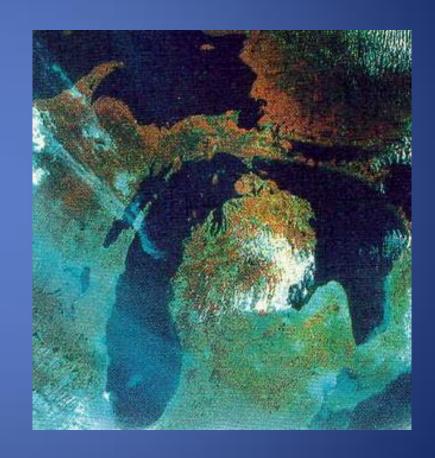




## **Areas of Collaboration**

- Develop climate models for Michigan Climate & Health Profile Report (CHPR)
- Support regional & local adaptation efforts

Challenges



## CHPR Approach

- 1. Link key health impacts to climate variables
- 2. Describe historic climate trends
- 3. Synthesize future climate projections
- 4. Predict likely future health trends related to climate projections
- 5. Note regional differences

## Key Climate/Health Relationships

Key Health Outcome	Biophysical Parameter	Climate Factors
Respiratory Diseases	Air Pollutants; Pollen; Mold	Warm temperature; humidity; extreme ppt.
Heat Morbidity, Mortality	Heat Stress	Warm temperature; humidity;
Injury, CO Poisoning	Power Outages; Storms & Cleanup; Ice; Cold	Extreme events; winter ppt as rain
Waterborne Diseases, Toxins	Algal blooms; Flooding; Ecosystem Changes	Warm temperature; extreme ppt; high humidity
Vectorborne Diseases	Mosquitoes, Ticks	Warm winter/spring; humid spring/fall, hot, dry summer.

## **GLISA Contribution to CHPR**

- Describe historic climate trends & important climate drivers for state, subregions
- Synthesize future projections from national & Midwest technical climate reports along w MIspecific analyses: Great Lakes Ensemble
- Projections for entire state, w. regional differences noted; limited downscaling
- Higher spatial resolution does not improve model uncertainty

## Where is adaptation happening?

## state

- 8 emergency prepregions
- 12 tribal governments
- 45 local health depts
- 83 counties
- 276 cities, 257 villages
   & 1240 townships
- Multiple regional

**NOAA's Ten Climate Divisions** 



# What information do communities need for climate health adaptation?

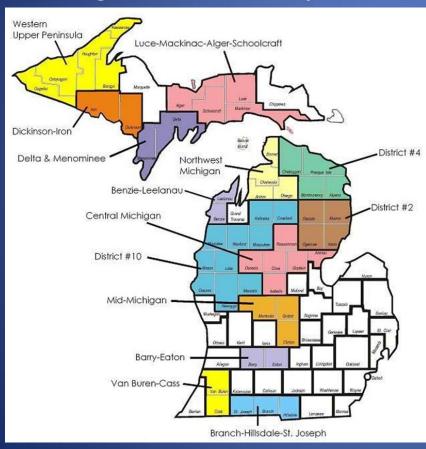
- Local climate-related health threats (eg, Lyme disease, asthma prevalence)
- Local population and biophysical vulnerability (eg low SES, areas in flood plain)
- Current climate & trends, local to regional
- As most planning is on short (< 20 yr) time scale, model projections less important

## **Scaling Climate Information**

- Historic daily temperature and precipitation data available for observation stations
  - What about other locales in the state?
- Some data can be smoothed to create monthly estimates for MI's 10 Climate Divisions
- GLISA Climate Division Reports give seasonal trends 1940-2000 for ave. temperature and total precipitation, along w. typical climate & drivers

# Climate Data Accessible, Usable at all levels for adaptation

## Michigan's Local Health Departments









## Michigan Climatic Division 10 Southeast Lower

Included counties: Genesee, Lapeer, Lenawee, Livingston, Macamb, Monroe, Oakland, St. Clair, Wayne,

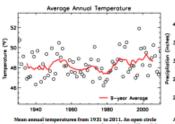
The Southeast Lower Climatic Division of Michigan is bounded by the Ohio border to the south, Lake Huron, Lake St Clair, and Lake Erie to the east, and extends west to include the cities of Flint and Ann Arbor. The terrain is diverse, ranging from the extremely urbanized areas of downtown Detroit, to expansive agricultural lands in the Thumb, to rolling forests peppered with inland lakes in the central counties.

This region experiences a humid continental climate dominated primarily by the movement of high and low pressure systems. Large seasonal temperature variations and highly variable daily weather patterns are common. Long periods of intense heat or severe cold are relatively rare, and the Great Lakes do provide some moderation of temperature compared to areas at similar latitudes that are outside the Great Lakes Basin. There are occasional spells of lake-effect precipitation, but lake effects are typically limited to increased cloudiness in the fall and winter. Most of the annual precipitation falls during the summer months in the form of afternoon thunderstorms. Snow cover is less severe and of shorter duration than in northern regions of the state.

Mean Annual Temperature	48.7°F	9.3°C
Mean Annual Total Precipitation	33.8 in	85.9 cm

## Changes in Mean Temperature (\*F) from 1951-1980 to 1981-2010

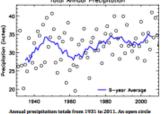
Annual	0.6
Winter, December-February	1.4
Spring, March-May	1.0
Summer, June-August	0.3
Fall, September-November	



represents the average temperature of a single year. The solid

## Change in Mean Total Precipitation (%) from 1951-1980 to 1981-2010

Winter, December-February Spring, March-May Summer, June-August	12.7
Spring, March-May Summer, June-August	2.6
Summer, June-August	
	5.3
Fall, September-Navember	

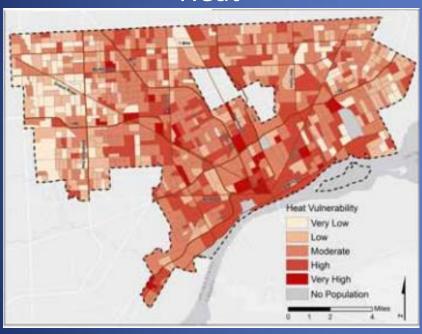


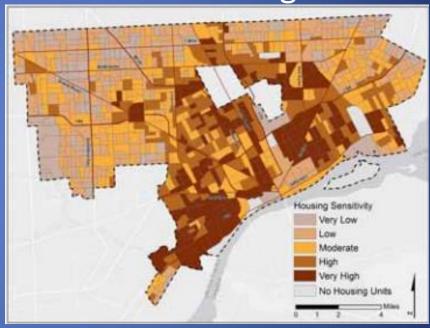
represents the total precipitation for a single year. The solid line

# Observed Climate Data, Trends + Detailed Vulnerability Assessment

University of Michigan Taubman College of Architecture and Urban Planning & Detroit Climate Action Collaborative (DCAC)

Heat Flooding





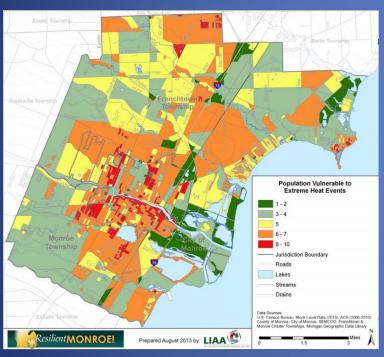
Detroit Climate Action Planning Framework

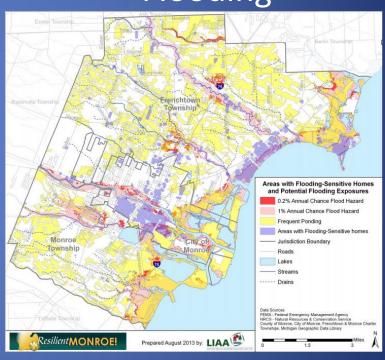
# Regional Climate Data, Trends + **Detailed Vulnerability Assessment**

Land Information Access Association (LIAA)

Heat

Flooding





Resilient Communities Program

## **Special Thanks**

From the Great Lakes Integrated Sciences + Assessment program (GLISA): www.umich.glisa.edu

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MICHIGAN STATE